

Appendix C

Fire Behavior

Weather/Climatology

The Carson City area and surrounding mountains/desert has had a severe and protracted drought the last several years. Vegetation/fuels have been stressed as a result. Previous years as well as earlier fire events this year witnessed extreme fire behavior events; indicative of the protracted drought and resulting fuel condition.

Review of two Remote Area Weather Stations (RAWS), Little Valley (Non-NFDRS) and Galena indicate no significant rainfall during the prior seven days in fire weather zone (450).

National Weather Service Fire Weather forecasts (Reno office) from Tuesday July 13, 2004 and Wednesday July 14, 2004 predicted that the weather pattern in the area would continue for the next several days. An upper level ridge over the Southwest US continued to keep conditions dry and warm throughout the area. Winds at the 20' level were expected to be from the Southwest 10-15 mph with gusts to 25 mph. Predicted relative humidity during the day was 8-13%, with evening recoveries to 30-40%. A predicted Hanes index of 5.

Appendix C Exhibit 1

Live fuel moistures from the Warm Springs (CCD) monitoring site indicated LFM of 102%. Observations from the fireline on July 14, 2004 provided the following information:

0650 Elev. 6000 Ft Temp 62° Rh 21% Winds 17 mph (eye level)

Observations were taken at top of the ridge.

0800 Elev. 5500 Ft Temp 68° Rh 18% Winds- light upslope

Observations were taken in the canyon bottom.

These observations have been used in formulation of the fire behavior calculations.

Fuel Conditions

The most notable fuel condition is the drying of the 1000 hour Time Lag Fuel Moisture (TLFM). Data collected (July 5, 2004) from the Great Basin Live Fuel Moisture Project (GBLFMP) indicates a six (6) % 1000 TLFM from the Markleeville monitoring site. This site is south of the incident on Carson City BLM lands.

The most recent sampling of Live Fuel Moisture (LFM) from the Warm Springs monitoring site (July 5) indicated a LFM of 102%. This figure places the predicted fire behavior at the upper end of the high category approaching the extreme fire behavior category.

One Hour Time Lag Fuel Moisture (TFLM) can be an indicator of extreme fire behavior conditions. One hour fuel moistures were calculated at 7% using the 0650 weather observations. Using the information from the spot forecast Probability of Ignition is 80% at 0800.

Fuels

The fuels above the Kings Canyon Road are comprised of stringers and groves of Jeffery Pine, mixed brush types and mixed grasses including cheatgrass. The areas below the Kings Canyon

road consist of mixed brush and grasses that are interspersed in open stands of Jeffery Pine. Fuels are continuous throughout the area. Fuel loadings are moderate to heavy. Fuels covered from 60 to 80 % of the area. The primary Fire Behavior Fuel Model selected for calculations is FM 6, Dormant Brush and Hardwood Slash.

Appendix C Exhibit 2

Topography

Topography of the area consisted of slope between 16 -70% above the burnover site and 0-15% below the burnover site.

Appendix C Exhibit 3

Fire Behavior Summary

Fire Behavior calculations were completed using Behave+ Ver.2.02 software. Inputs were obtained from weather observations from the scene and from National Weather Service (Reno office) fire weather forecasts. Remote Automated Weather Station (RAWS) data was obtained from the Little Valley RAWS station and Galena RAWS station. Weather observations from the field were used to obtain Waterfall Spot weather forecast at 0730 on July 14, 2004.

Appendix C Exhibit 4

Data from the Galena RAWS station was used in the formulation of Waterfall Spot1 weather forecast obtained at 1341 on July 14, 2004.

Appendix C Exhibit 5

Based on calculations, rates of spread in the area of concern were calculated to be 60 chains per hour (3960 ft). Flame lengths could be expected 6-15 feet. Spotting in front of the flaming front could be expected up .3 mi (1584 ft) ahead of the fire.

The Waterfall Fire apparently started from a campfire in the upper Kings Canyon drainage, west of Carson City on July14, 2004. The fire was reported around 0257 that morning. First arriving units reported fairly active fire behavior for that time of day and the fuel type the fire was in. The fire was burning in a somewhat closed stand of Jeffery Pine. The slope in the area of the origin is from 31-60 %. Temperatures were estimated to be 50-60°F. Relative Humidity was estimated to be around 20-30%. Winds were light and up-canyon.

The active fire behavior for this time of day has been attributed to a thermal belt in the canyon areas around 5500-6500 feet. Using the 0650 weather observations the calculated Rh would be 39% at that time of day. The measured Rh was actually 21%. This is an indicator that the area was influenced by a thermal belt.

The fire made several fairly active uphill runs with torching trees during the morning hours. The fire was on a West aspect uninfluenced by daytime heating.

At around 0900 the fire was reaching the top of the ridgeline. Spot fires on the eastern aspect were becoming active. These fires were picked up by crews using direct attack tactics. The main movement of the fire was to the south through a stand of Jeffery Pine.

As the fire moved out of the timber line and into areas of brush and grass understory, which was receiving solar heating, fire activity began to increase. Fire activity was moderate and within predicted limits.

Appendix C Exhibit 6

After 1230 conditions began to change that would significantly affect the fire. Winds were beginning to shift to a down canyon flow from the southwest. As the wind shift met with the fire, fire whirls began developing on southern edge of the fire. As the fire whirls continued to develop and move down slope towards the Kings Canyon road.

At around 1250 spot fires were becoming established below the Kings Canyon Rd. The main fire above the road was spreading across the face of the slope by the southwest winds.

The spot fires below the road were fairly active. An attempt was made to contain the spot fires with direct attack tactics. As the amount of spot fires began to increase above and below the road direct tactics were ineffective and abandoned.

After 1300 the spot fires below the road had become a fast moving fire in brush and understory on the lower slope. Fire behavior predictions estimated rates of spread in this area at 60 chains per hour. From 1300 to approximate time of burnover 1315 the fire is estimated to have moved approximately 900 feet in the direction of the Staging Area 2.

This information is verified by calculating how fast the fire is estimated to be moving per minute. The rate of spread is 66 ft per minute. Calculations estimate that it would take 13.5 minutes to move into the Staging Area 2.

After factoring in the spotting component, torching trees and the increasing winds, extreme fire behavior occurred and has been validated with eyewitness accounts and photographic evidence.

At the roads edge in the Staging Area 2, there were numerous large fully mature Jeffery Pines (24" dbh or greater) interspersed with brush and understory. These trees had branches near the ground. These branches contributed to the fire spreading through several of these trees during the burnover. Other smaller trees were also torching along the roads edge. Debris and ember fallout along with radiant and convective heat from these torching trees ignited several parked vehicles.

The burnover event is estimated to have lasted approximately 2-5 minutes in duration.

Another factor that contributed to the extreme fire intensity at in the Staging Area 2 was the simultaneous blow-up of the north end of the fire. As a result of this blow-up, up-canyon winds were funneled from the drainages below this area. This in-draft was a contributing factor to the fire being drawn into the Staging Area 2.

Appendix C Exhibit 7

FNUS55 KREV 131421
FWFREV

FIRE WEATHER PLANNING FORECAST FOR NORTHEAST CA AND WESTERN NV
NATIONAL WEATHER SERVICE RENO NV
730 AM PDT TUE JUL 13 2004

...ISOLATED DRY THUNDERSTORMS POSSIBLE ON THURSDAY BEFORE
TRANSITIONING INTO WETTING THUNDERSTORMS THURSDAY NIGHT AND FRIDAY...

.DISCUSSION...
DRY AND WARM CONDITIONS WILL CONTINUE THROUGH WEDNESDAY NIGHT AS AN
UPPER LEVEL RIDGE REMAINS OVER THE SOUTHWEST US. MONSOON MOISTURE IS
EXPECTED TO REACH ZONES 459 AND 273 BY THURSDAY AFTERNOON WITH
ISOLATED DRY THUNDERSTORMS POSSIBLE. BY THURSDAY NIGHT AND FRIDAY...
INCREASED TROPICAL MOISTURE WITHIN THE MONSOONAL FLOW MAY PRODUCE
WETTING RAIN OVER SOME AREAS. BY THIS WEEKEND...DRY CONDITIONS ARE
EXPECTED TO RETURN WITH LOCALLY BREEZY CONDITIONS POSSIBLE IN THE
AFTERNOON AND EVENING.

NOTE: THUNDERSTORMS IMPLY GUSTY AND ERRATIC WINDS
NOTE: PLEASE SEE OPERATING PLAN FOR DETAILED ZONE DESCRIPTIONS
WWW.WRH.NOAA.GOV/RENO/FIRE

NVZ450-453-132330-

NV ZONE 450 WESTERN NEVADA INCLUDING CARSON CITY, DOUGLAS AND
STOREY COUNTIES, SOUTHERN WASHOE COUNTY AND LYON
COUNTY

REGION INCLUDES: A PORTION OF THE HUMBOLDT TOIYABE NF

NV ZONE 453 WEST CENTRAL NEVADA BASIN AND RANGE INCLUDING
PERSHING AND CHURCHILL COUNTIES, EAST-CENTRAL
WASHOE COUNTY, AND NORTHERN LYON COUNTY

730 AM PDT TUE JUL 13 2004

.TODAY...
SKY/WEATHER.....SUNNY.
MAX TEMPERATURE.....
VALLEYS.....88-98.
MID SLOPE.....84-93.
24 HR TREND.....LITTLE CHANGE.
MIN HUMIDITY.....
VALLEYS.....7-12%
MID SLOPE.....9-16%
24 HR TREND.....LITTLE CHANGE.
20-FOOT WINDS.....
VALLEYS/SLOPE...UPSLOPE 4-8 MPH BECOMING SOUTHWEST 10 TO 15 MPH
WITH LOCAL GUSTS TO 30 MPH IN THE AFTERNOON.
RIDGE TOP.....SOUTHWEST 10 TO 20 MPH.
HAINES INDEX.....5.
LAL.....1.
MIXING HEIGHT.....18000-19000 FT MSL.
TRANSPORT WINDS.....SOUTHWEST 10 TO 15 MPH.

.TONIGHT...
SKY/WEATHER.....CLEAR.
MIN TEMPERATURE.....
VALLEYS.....52-62.
MID SLOPE.....55-65.
24 HR TREND.....2 DEGREES WARMER.
MAX HUMIDITY.....
VALLEYS.....32-42%
MID SLOPE.....27-37%.

Thursday July 15, 2004

24 HR TREND.....2% DRIER
 20-FOOT WINDS.....
 VALLEYS/SLOPE....WEST WINDS 10 TO 15 MPH WITH GUSTS 25 TO 30
 MPH IN THE EVENING BECOMING DOWNSLOPE 2-6 MPH.
 RIDGE TOP.....SOUTH 10 TO 15 MPH.
 HAINES INDEX.....4.
 LAL.....1.

.WEDNESDAY...
 SKY/WEATHER.....MOSTLY SUNNY.
 MAX TEMPERATURE.....

VALLEYS.....91-101.
 MID SLOPE.....87-96.

MIN HUMIDITY.....
 VALLEYS.....6-11%
 MID SLOPE.....9-14%

20-FOOT WINDS.....
 VALLEYS/SLOPE....UPSLOPE 4-8 MPH BECOMING WEST 10 TO 15 MPH WITH
 ISOLATED GUSTS TO 30 MPH IN THE AFTERNOON.

RIDGE TOP.....SOUTHWEST 10 TO 15 MPH.
 HAINES INDEX.....5.
 LAL.....1.

.THURSDAY...MOSTLY CLEAR IN THE MORNING THEN PARTLY CLOUDY. LOWS IN
 THE 50S TO LOWER 60S. HIGHS IN THE 80S TO UPPER 90S. SOUTHWEST WINDS
 10 TO 15 MPH.

.FRIDAY...MOSTLY CLOUDY WITH A CHANCE OF THUNDERSTORMS. LOWS IN THE
 50S TO LOWER 60S. HIGHS IN THE 80S TO LOWER 90S. SOUTHWEST WINDS
 AROUND 10 MPH.

.SATURDAY...MOSTLY CLEAR. LOWS IN THE 50S TO LOWER 60S. HIGHS IN THE
 80S TO LOWER 90S. WEST WINDS 10 TO 20 MPH.

.SUNDAY...MOSTLY CLEAR. LOWS IN THE 50S TO LOWER 60S. HIGHS IN THE
 80S TO MID 90S.

.MONDAY...CLEAR. LOWS IN THE 50S TO LOWER 60S. HIGHS IN THE 80S TO
 MID 90S.

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CAZ272-132330-

 CA ZONE 272 GREATER LAKE TAHOE AREA

REGION INCLUDES: EAST OF THE SIERRA CREST AND THE FOREST SERVICE'S
 LAKE TAHOE BASIN MANAGEMENT UNIT

 730 AM PDT TUE JUL 13 2004

.TODAY...
 SKY/WEATHER.....SUNNY.
 MAX TEMPERATURE.....
 VALLEYS.....80-90.
 MID SLOPE.....72-82.
 24 HR TREND.....LITTLE CHANGE.

MIN HUMIDITY.....
 VALLEYS.....10-18%
 MID SLOPE.....17-22%
 24 HR TREND.....LITTLE CHANGE.

20-FOOT WINDS.....
 VALLEYS/SLOPE....UPSLOPE 4-8 MPH BECOMING SOUTHWEST 10 TO 15 MPH
 IN THE AFTERNOON. LOCAL GUSTS UP TO 30 MPH.

RIDGE TOP.....SOUTHWEST 15 TO 25 MPH.
 HAINES INDEX.....4.
 LAL.....1.

MIXING HEIGHT.....15500-16500 FT MSL.
 TRANSPORT WINDS....SOUTH 15 TO 20 MPH.

.TONIGHT...
 SKY/WEATHER.....CLEAR.
 MIN TEMPERATURE.....
 VALLEYS.....44-54.

24 HR TREND.....2% DRIER
 20-FOOT WINDS.....
 VALLEYS/SLOPE....WEST WINDS 10 TO 15 MPH WITH GUSTS 25 TO 30
 MPH IN THE EVENING BECOMING DOWNSLOPE 2-6 MPH.
 RIDGE TOP.....SOUTH 10 TO 15 MPH.
 HAINES INDEX.....4.
 LAL.....1.

.WEDNESDAY...
 SKY/WEATHER.....MOSTLY SUNNY.
 MAX TEMPERATURE.....
 VALLEYS.....91-101.
 MID SLOPE.....87-96.
 MIN HUMIDITY.....
 VALLEYS.....6-11%
 MID SLOPE.....9-14%
 20-FOOT WINDS.....
 VALLEYS/SLOPE....UPSLOPE 4-8 MPH BECOMING WEST 10 TO 15 MPH WITH
 ISOLATED GUSTS TO 30 MPH IN THE AFTERNOON.
 RIDGE TOP.....SOUTHWEST 10 TO 15 MPH.
 HAINES INDEX.....5.
 LAL.....1.

.THURSDAY...MOSTLY CLEAR IN THE MORNING THEN PARTLY CLOUDY. LOWS IN
 THE 50S TO LOWER 60S. HIGHS IN THE 80S TO UPPER 90S. SOUTHWEST WINDS
 10 TO 15 MPH.

.FRIDAY...MOSTLY CLOUDY WITH A CHANCE OF THUNDERSTORMS. LOWS IN THE
 50S TO LOWER 60S. HIGHS IN THE 80S TO LOWER 90S. SOUTHWEST WINDS
 AROUND 10 MPH.

.SATURDAY...MOSTLY CLEAR. LOWS IN THE 50S TO LOWER 60S. HIGHS IN THE
 80S TO LOWER 90S. WEST WINDS 10 TO 20 MPH.

.SUNDAY...MOSTLY CLEAR. LOWS IN THE 50S TO LOWER 60S. HIGHS IN THE
 80S TO MID 90S.

.MONDAY...CLEAR. LOWS IN THE 50S TO LOWER 60S. HIGHS IN THE 80S TO
 MID 90S.

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CAZ272-132330-

 CA ZONE 272 GREATER LAKE TAHOE AREA

REGION INCLUDES: EAST OF THE SIERRA CREST AND THE FOREST SERVICE'S
 LAKE TAHOE BASIN MANAGEMENT UNIT

 730 AM PDT TUE JUL 13 2004

.TODAY...
 SKY/WEATHER.....SUNNY.
 MAX TEMPERATURE.....
 VALLEYS.....80-90.
 MID SLOPE.....72-82.
 24 HR TREND.....LITTLE CHANGE.
 MIN HUMIDITY.....
 VALLEYS.....10-18%
 MID SLOPE.....17-22%
 24 HR TREND.....LITTLE CHANGE.
 20-FOOT WINDS.....
 VALLEYS/SLOPE....UPSLOPE 4-8 MPH BECOMING SOUTHWEST 10 TO 15 MPH
 IN THE AFTERNOON. LOCAL GUSTS UP TO 30 MPH.
 RIDGE TOP.....SOUTHWEST 15 TO 25 MPH.
 HAINES INDEX.....4.
 LAL.....1.
 MIXING HEIGHT.....15500-16500 FT MSL.
 TRANSPORT WINDS.....SOUTH 15 TO 20 MPH.

.TONIGHT...
 SKY/WEATHER.....CLEAR.
 MIN TEMPERATURE.....
 VALLEYS.....44-54.

MID SLOPE 48-58.

24 HR TREND LITTLE CHANGE.

MAX HUMIDITY VALLEYS .64-74% MID SLOPE .53-63%.

24 HR TREND... LITTLE CHANGE.

20-FOOT WINDS VALLEYS/SLOPE. ...SOUTHWEST WINDS AROUND 10 MPH WITH GUSTS TO 25 MPH IN THE EVENING BECOMING DOWNSLOPE 2-6 MPH.

RIDGE TOP SOUTH 15 TO 25 MPH. HAINES INDEX .4.

LAL .1. .WEDNESDAY...

SKY/WEATHER ...SUNNY.

MAX TEMPERATURE VALLEYS. 80-90. MID SLOPE 75-85. MIN HUMIDITY VALLEYS 9-17% MID SLOPE 16-21%

20-FOOT WINDS. .'. '"

VALLEYS/SLOPE... UPSLOPE 4-8 MPH BECOMING SOUTHWEST 10 TO 15 MPH IN THE AFTERNOON. ISOLATED GUSTS UP TO 30 MPH. RIDGE TOP SOUTHWEST AROUND 15 MPH. HAINES INDEX S.

LAL .1.

.THURSDAY...MOSTLY CLEAR. LOWS IN THE 40S TO MID 50s. HIGHS IN THE 70S TO MID 80S. SOUTHWEST WINDS 10 TO 15 MPH.

.FRIDAY...MOSTLY CLOUDY WITH A CHANCE OF THUNDERSTORMS. LOWS IN THE 40S TO UPPER 50S. HIGHS IN THE 70S TO LOWER 80s. SOUTHWEST WINDS

AROUND 10 MPH.

.SATURDAY...MOSTLY CLEAR. LOWS IN THE 40S TO MID 50S. HIGHS IN THE 70S TO LOWER 80S. SOUTHWEST WINDS 10 TO 20 MPH.

.SUNDAY...MOSTLY CLEAR. LOWS IN THE 40S TO MID 50S. HIGHS IN THE 70S TO LOWER 80S.

.MONDAY...CLEAR. LOWS IN THE 40S TO MID 50S. HIGHS IN THE 70s TO MID 80S.

Jui 15, 04 13:35 text 1: -3:FWFREv (selection) Page 1/4

FNUS55 I<REV 132203
FWFREv

FIRE WEATHER PLANWING FORECAST FOR NORTHEAST CA AND WESTERN NV NATIONAL WEATHER
SERVICE RENO NV
229 PM PDT TOE JUL 13 2004

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...ISOLATED DRY THUNDERSTORMS POSSIBLE ON THURSDAY BEFORE
TRANSITIONING INTO WETTING THUNDERSTORMS THURSDAY NIGHT AND FRIDAY...

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.DISCUSSION...

DRY AND WARM CONDITIONS WILL CONTINUE THROUGH WEDNESDAY NIGHT AS AN UPPER LEVEL HIGH
PRESSURE RIDGE REMAINS OVER THE SOUTHWEST US.
MONSOONAL MOISTURE IS EXPECTED TO REACH ZONES 459 AND 273 BY THURSDAY AFTERNOON WITH
ISOLATED DRY THUNDERSTORMS POSSIBLE. BY THURSDAY NIGHT AND FRIDAY... INCREASED TROPICAL
MOISTURE WITHIN THE MONSOONAL FLOW MAY PRODUCE WETTING RAIN OVER SOME AREAS. BY THIS
WEEKEND...DRY
CONDITIONS ARE EXPECTED TO RETURN WITH LOCALLY BREEZY CONDITIONS POSSIBLE IN THE
AFTERNOONS AND EVENINGS.

NOTE: THUNDERSTORMS IMPLY GUSTY AND ERRATIC WINDS

NOTE: PLEASE SEE OPERATING PLAN FOR DETAILED ZONE DESCRIPTIONS
WWW.WRH.NOAA.GOV/RENO/FIRE

NVZ450-453-141S00-

+++++T+++++T++++TT+++++T+++++T NV ZONE 450
WESTERN NEVADA INCLUDING CARSON CI-Y / DOUGLAS AND
STOREY COUNTIES, SOUTHERN WASHOE COUNTY AND LYON. COUNTY

REGION INCLUDES: A PORTION OF THE HUMBOLDT TOIYABE NF

NV ZONE 453 WEST CENTRAL NEVADA BASIN AND RANGE INCLUDING PERSHING AND CHURCHILL
COUNTIES, EAST-CENTRAL WASHOE COUNTY, AND NORTHERN LYON COUNTY

+++++T+++++T+++++T+++++T+++++T
229 PM PDT TUE JUL 13 2004

.TONIGHT..

SKY/WEATHER MOSTLY CLEAR.

MIN TEMPERATURE VALLEYS 52-62. ! MID SLOPE 55-65.

24 HR TREND LITTLE CHANGE.

MAX HUMIDITY VALLEYS. 34-44% MID SLOPE 28-38%.

24 HR TREND LITTLE CHANGE.

20-FOOT WINDS VALLEYS/SLOPE...NORTHWEST WINDS AROUND 10 MPH WITH rSOLATED
GUSTS TO 30 MPH IN THE EVENING BECOMING DOWNSLOPE 2-6 MPH.
RIDGE TOP SOUTH 15 TO 20 MPH. HAINES INPEX 5. LAL. 1.

.WEDNESDAY...

SKY/WEATHER MOSTLY SUNNY.

MAX TEMPERATURE VALLEYS. 91-101. MID SLOPE. 87-97.

24 HR TREND LITTLE CHANGE.

MIN HUMIDITY VALLEYS 7-12%

MID SLOPE .10-1S%

hursday July 15, 2004 1/4

Ju115,04 13:35 Text 1: -3:FWFREv (selection) Page 2/4

24 HR TREND.. LITTLE CHANGE. 20-FOOT WINDS; .

VALLEYS/SLOPE... .UPSLOPE 4-8 MPH BECOMING WEST AROUND 10 MPH IN
THE AFTERNOON. ISOLATED GUSTS UP TO 30 MPH. RIDGE TOP
..SOUTHWEST 10 TO 15 MPH. HAINES INDEX ...5.

LAL .1.

MIXING HEIGHT .18500-19500 FT MSL.

TRANSP~T WINDS .SOUTHWEST 10 TO 15 MPH.

.WEDNESDAY NIGHT...

SKY/WEATHER ..MOSTLY CLEAR. MIN TEMPERATURE VALLEYS 54-64.

MID SLOPE .57-67. MAX HUMIDITY VALLEYS .35-45%

MID SLOPE .32-42%.

20-FOOT WINDS. ...

VALLEYS/ SLOPE. ...WEST WINDS AROUND 10 MPH WITH ISOLATED GUSTS TO 30 MPH IN THE EVENING BECOMING
DOWNSLOPE

2-6 MPH.

RIDGE TOP. SOUTH 10 TO 15 MPH. HAINES INDEX.. 5.

LAL .1.

.THURSDAY. -

SKY/WEATHER .MOSTLY SUNNY THEN BECOMING PARTLY CLOUDY. SLIGHT
CHANCE OF THUNDERSTORMS IN THE AFTERNOON.

MAX TEMPERATURE VALLEYS 89-99.

MID SLOPE 85-94. MIN HUMIDITY VALLEYS. 9-14%

MID SLOPE .12-19%

20-FOOT WINDS VALLEYS/SLOPE UPSLOPE 4-8 MPH BECOMING WEST AROUND
10 MPH WITH ISOLATED GUSTS TO 30 MPH IN THE AFTERNOON. RIDGE TOP
SOUTHWEST 15 TO 20 MPH. HAINES INDEX ..4.

LAL .2.

CHC WETTING RAIN. ...10%

.FRIDAY. ..PARTLY CLOUDY. CHANCE OF SHOWERS AND THUNDERSTORMS. LOWS

IN THE 50S TO MID 60S. HIGHS IN THE 70S TO UPPER 80S. LIGHT
SLOPE
WINDS.

.SATURDAY. ..PARTLY CLOUDY. SLIGHT CHANCE OF SHOWERS AND

THUNDERSTORMS. LOWS IN THE 50s TO LOWER 60S. HIGHS IN THE 80S TO
LOWER 90S. LIGHT SLOPE WINDS.

.SUNDAY.. .MOSTLY CLEAR. SLIGHT CHANCE OF THUNDERSTORMS. LOWS IN
THE

50S TO LOWER 60S. HIGHS IN THE 80S TO LOWER 90S -WEST WINDS AROUND
10 MPH.

.MONDAY... .MOSTLY CLEAR. LOWS IN THE 40S TO UPPER 50S. HIGHS IN
THE 80S TO MID 90S.

.TUESDAY.. .CLEAR. LOWS IN THE 40S TO UPPER 50S. HIGHS IN THE
80S TO MID 90S.

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CAZ272-141500-

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CA ZONE 272 GREATER LAKE TAHOE AREA

REGION INCLUDES: EAST OF THE SIERRA CREST AND THE FOREST SERVICE'S LAKE TAHOE BASIN MANAGEMENT UNIT

+++++~+++++
++++~ 229 PM PDT TUE JUL 13 2004

.TONIGHT... .

SKY/WEATHER .CLEAR.

2/4 Thursday July 15, 2004

Jul 15, 04 13:35

Text 1: -3:FWFREVE (selection)

Page 3/4

MIN TEMPERATURE.....
VALLEYS.....40-50.
MID SLOPE.....43-53.
24 HR TREND.....LITTLE CHANGE.
MAX HUMIDITY.....
VALLEYS.....73-83%
MID SLOPE.....69-79%.
24 HR TREND.....7% WETTER.
20-FOOT WINDS.....
VALLEYS/SLOPE....WEST WINDS AROUND 10 MPH WITH ISOLATED GUSTS
TO 30 MPH IN THE EVENING BECOMING DOWNSLOPE
2-6 MPH.
RIDGE TOP.....SOUTH 20 TO 25 MPH.
HAINES INDEX.....4.
LAL.....1.

.WEDNESDAY...
SKY/WEATHER.....SUNNY.
MAX TEMPERATURE.....
VALLEYS.....82-92.
MID SLOPE.....75-85.
24 HR TREND.....LITTLE CHANGE.
MIN HUMIDITY.....
VALLEYS.....6-11%
MID SLOPE.....12-17%
24 HR TREND.....3% DRIER.
20-FOOT WINDS.....
VALLEYS/SLOPE....UPSLOPE 4-8 MPH BECOMING SOUTHWEST AROUND 10 MPH
IN THE AFTERNOON. ISOLATED GUSTS UP TO 30 MPH.
RIDGE TOP.....SOUTHWEST AROUND 15 MPH.
HAINES INDEX.....5.
LAL.....1.
MIXING HEIGHT.....16000-17000 FT MSL.
TRANSPORT WINDS.....SOUTH 10 TO 15 MPH.

.WEDNESDAY NIGHT...
SKY/WEATHER.....MOSTLY CLEAR.
MIN TEMPERATURE.....
VALLEYS.....49-59.
MID SLOPE.....53-63.
MAX HUMIDITY.....
VALLEYS.....74-84%
MID SLOPE.....69-79%.
20-FOOT WINDS.....
VALLEYS/SLOPE....DOWNSLOPE 2-6 MPH.
RIDGE TOP.....SOUTH AROUND 15 MPH.
HAINES INDEX.....5.
LAL.....1.

.THURSDAY...
SKY/WEATHER.....MOSTLY SUNNY.
MAX TEMPERATURE.....
VALLEYS.....79-89.
MID SLOPE.....74-84.
MIN HUMIDITY.....
VALLEYS.....8-13%
MID SLOPE.....14-19%
20-FOOT WINDS.....
VALLEYS/SLOPE....UPSLOPE 4-8 MPH BECOMING SOUTHWEST AROUND 10 MPH
WITH ISOLATED GUSTS TO 30 MPH IN THE AFTERNOON.
RIDGE TOP.....SOUTHWEST AROUND 15 MPH.
HAINES INDEX.....4.
LAL.....1.

.FRIDAY...PARTLY CLOUDY. CHANCE OF SHOWERS AND THUNDERSTORMS. LOWS
IN THE 50S TO LOWER 60S. HIGHS IN THE 60S TO UPPER 70S. LIGHT SLOPE
WINDS.
.SATURDAY...PARTLY CLOUDY. SLIGHT CHANCE OF SHOWERS AND
THUNDERSTORMS. LOWS IN THE 40S TO UPPER 50S. HIGHS IN THE 70S TO
LOWER 80S. LIGHT SLOPE WINDS.

Thursday July 15, 2004

.SUNDAY...MOSTLY CLEAR. LOWS IN THE 40S TO MID 50S. HIGHS IN THE 70S

TO LOWER 80S. SOUTHWEST WINDS AROUND 10 MPH.

.MONDAY...MOSTLY CLEAR. LOWS IN THE 40S TO LOWER 50S. HIGHS IN THE 70S TO MID 80S.

.TUESDAY...MOSTLY CLEAR. LOWS IN THE 40S TO MID 50S. HIGHS IN THE 70S TO MID 80S.

Ju115,0413:34 Text 1: -2:FWFREX (selection) Page 1/3

FNUS55 KREV 141134 FWFREV

FIRE WEATHER PLANNING FORECAST FOR NORTHEAST CA AND WESTERN NV NATIONAL WEATHER SERVICE RENO NV
730 AM PDT WED JUL 14 2004

...ISOLATED DRY THUNDERSTORMS POSSIBLE ON THURSDAY BEFORE
TRANSITIONING INTO WETTING THUNDERSTORMS THURSDAY NIGHT AND FRIDAY...

.DISCUSSION. .DRY AND WARM CONDITIONS WILL CONTINUE AS HIGH PRESSURE REMAINS OVER THE DESERT SOUTHWEST. MONSOONAL
MOISTURE IS EXPECTED TO REACH ZONES 459 AND 273 BY THURSDAY AFTERNOON~ WITH ISOLATED DRY
THUNDERSTORMS POSSIBLE. BY THURSDAY NIGHT AND FRIDAY. .INCREASED TROPICAL MOISTURE WITHIN THE MONSOONAL FLOW MAY
PRODUCE WETTING

RAINS OVER SOME AREAS. DRIER CONDITIONS ARE EXPECTED TO RETURN WITH LOCALLY BREEZY CONDITIONS POSSIBLE IN THE
AFTERNOONS AND EVENINGS THIS WEEKEND.

NOTE: THUNDERSTORMS IMPLY GUSTY AND ERRATIC WINDS

NOTE; PLEASE SEE OPERATING PLAN FOR DETAILED ZONE DESCRIPTIONS

WWW.WRH.NOAA.GOV/RENO/FIRE

NVZ450-453-151500-

+T+++++~+++++~+++++T++++~++++T++++~++++~T++ NV ZONE 450 WESTERN NEVADA INCLUDING CARSON CITY, DOUGLAS AND
STOREY COUNTIES, SOUTHERN WASHOE COUNTY AND LYON
COUNTY

REGION INCLUDES: A PORTION OF THE HUMBOLDT TOIYABE NF

NV ZONE 453 WEST CENTRAL NEVADA BASIN AND RANGE INCLUDING PERSHING AND CHURCHILL COUNTIES, EAST-CENTRAL WASHOE
COUNTY, AND NORTHERN LYON COUNTY +T++++~++++~++++~T++++~++++~T++++~++++~T++++~T+++++ 730 AM
PDT WED JUL 14 2004

.TODAY..

SKY/WEATHER... MOSTLY SUNNY.

MAX TEMPERATURE VALLEYS .90-100. MID SLOPE 87-97.

24 HR TREND LITTLE CHANGE.

MI~ HUMIDITY. VALLEYS. 7-12% MID SLOPE 8-13%

24 HR TREND ..LIT'L'LE CHANGE.

20-FOOT WINDS VALLEYS/SLOPE... .UPSLOPE 4-8 MPH BECOMING WEST 10
TO 15 MPH WITH

GUSTS 25 TO 30 MPH IN THE AFTERNOON.

RIDGE TOP .SOUTHWEST 10 TO 15 MPH. HAINES INDEX .5.

LAL -'.", "' . .1.

MIXING HEIGHT .18000-18500 FT MSL.

TRANSPORT WINDS SOUTHWEST 10 TO 15 MPH.

.TONIGHT..

SKY/WEATHER .MOSTLY CLEAR THEN BECOMING PARTLY CLOUDY.

MIN TEMPERATURE VALLEYS -.54-64. MID SLOPE -.57-67.

24 HR TREND .LITTLE CHANGE. MAX HUMIDITY VALLEYS. 39-49%

MID SLOPE 30-40~

24 HR TREND .4% WETTER.

Thursday July 15, 2004 13

Jul 15, 04 13:34

Text 1: -2:FWFREY (selection)

Page 2/3

20-FOOT WINDS.....
VALLEYS/SLOPE....WEST WINDS 10 TO 15 MPH WITH GUSTS 25 TO 30 MPH
IN THE EVENING BECOMING DOWNSLOPE 2-6 MPH.
RIDGE TOP.....SOUTH 10 TO 15 MPH.
HAINES INDEX.....5.
LAL.....1.

.THURSDAY...
SKY/WEATHER.....PARTLY CLOUDY.
MAX TEMPERATURE.....

VALLEYS.....89-99.
MID SLOPE.....86-96.
MIN HUMIDITY.....
VALLEYS.....9-14%
MID SLOPE.....10-15%

20-FOOT WINDS.....
VALLEYS/SLOPE....UPSLOPE 4-8 MPH BECOMING WEST 10 TO 15 MPH WITH
GUSTS 25 TO 30 MPH IN THE AFTERNOON.
RIDGE TOP.....SOUTHWEST 15 TO 20 MPH.
HAINES INDEX.....5.
LAL.....1.

.FRIDAY...PARTLY CLOUDY. SLIGHT CHANCE OF SHOWERS AND THUNDERSTORMS.
LOWS IN THE LOWER 50S TO MID 60S. HIGHS IN THE MID 80S TO MID 90S.
AFTERNOON WEST WINDS 10 TO 15 MPH.

.SATURDAY...PARTLY CLOUDY. SLIGHT CHANCE OF SHOWERS AND
THUNDERSTORMS ZONE 453. LOWS IN THE MID 50S TO MID 60S. HIGHS IN THE
MID 80S TO MID 90S. AFTERNOON WEST WINDS 10 TO 20 MPH.

.SUNDAY...MOSTLY CLEAR. LOWS IN THE LOWER 50S TO LOWER 60S. HIGHS
IN THE LOWER 80S TO LOWER 90S. AFTERNOON WEST WINDS 10 TO 20 MPH.

.MONDAY...CLEAR. LOWS IN THE UPPER 40S TO UPPER 50S. HIGHS IN THE
MID 80S TO MID 90S.

.TUESDAY...CLEAR. LOWS IN THE UPPER 40S TO UPPER 50S. HIGHS IN THE
UPPER 80S TO UPPER 90S.

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CAZ272-151500-

+++++
CA ZONE 272 GREATER LAKE TAHOE AREA

REGION INCLUDES: EAST OF THE SIERRA CREST AND THE FOREST SERVICE'S
LAKE TAHOE BASIN MANAGEMENT UNIT

+++++
730 AM PDT WED JUL 14 2004

.TODAY...
SKY/WEATHER.....MOSTLY SUNNY.
MAX TEMPERATURE.....

VALLEYS.....78-88.
MID SLOPE.....75-85.
24 HR TREND.....LITTLE CHANGE.
MIN HUMIDITY.....

VALLEYS.....13-18%
MID SLOPE.....14-19%
24 HR TREND.....3% WETTER.

20-FOOT WINDS.....
VALLEYS/SLOPE....UPSLOPE 4-8 MPH BECOMING SOUTHWEST 10 TO 15 MPH
WITH GUSTS 25 TO 30 MPH IN THE AFTERNOON.
RIDGE TOP.....SOUTHWEST AROUND 15 MPH.

HAINES INDEX.....5.
LAL.....1.
MIXING HEIGHT.....18000-18500 FT MSL.
TRANSPORT WINDS.....SOUTH 10 TO 15 MPH.

.TONIGHT...
SKY/WEATHER.....MOSTLY CLEAR.
MIN TEMPERATURE.....
VALLEYS.....44-54.
MID SLOPE.....53-63.

24 HR TREND... 3 DEGREES WARMER. MAX HUMIDITY VALLEYS 70-80%

MID SLOPE.. 35-45%

24 HR TREND 4% WETTER.

20-FOOT WINDS VALLEYS/SLOPE.. SOUTHWEST 10 TO 15 MPH WITH
GUSTS TO 25 MPH BECOMING DOWNSLOPE 2-6 MPH. RIDGE TOP SOUTHWEST
AROUND 15 MPH. HAINES INDEX .5. LAL. 1.

.THURSDAY...

SKY/WEATHER... MOSTLY SUNNY THEN BECOMING PARTLY CLOUDY.

MAX TEMPERATURE VALLEYS 78-88.

MID SLOPE 75-85. MIN HUMIDITY VALLEYS .13-18%

MID SLOPE .14-19%

20-FOOT WINDS VALLEYS/SLOPE UPSLOPE 4-8 MPH BECOMING SOUTHWEST
10 TO 15 MPH

WITH GUSTS 25 TO 30 MPH IN THE AFTERNOON.

RIDGE TOP SOUTHWEST AROUND 15 MPH. HAINES INDEX 5.

LAL .1.

.FRIDAY.. PARTLY CLOUDY. CHANCE OF SHOWERS AND THUNDERSTORMS. LOWS
IN THE LOWER 40S TO LOWER 50S. HIGHS IN THE MID 70S TO MID 80S.
AFTERNOON SOUTHWEST WINDS 10 TO 15 MPH.

.SATURDAY.. PARTLY CLOUDY. LOWS IN THE LOWER 40S TO LOWER 50S.
HIGHS
IN THE LOWER 70S TO LOWER 80S. AFTERNOON SOUTHWEST WINDS 10 TO 20
MPH.

.SUNDAY.. MOSTLY CLEAR. LOWS IN THE LOWER 40S TO LOWER 50S.
HIGHS IN THE 70S TO LOWER 80S. AFTERNOON SOUTHWEST WINDS 10 TO
15 MPH.

.MONDAY.. CLEAR. LOWS IN THE MID 40S TO MID 50S. HIGHS IN THE
MID 70S TO MID 80S.

.TUESDAY.. MOSTLY CLEAR. LOWS IN THE LOWER 40S TO LOWER 50S.
HIGHS IN THE 70S TO MID 80S.

Spot Forecast for WATERFALL Spot Forecast for WATERFALL Fire
National Weather Service Reno
730 AM PDT Wed Jul 14 2004

IF CONDITIONS BECOME UNREPRESENTATIVE,
CONTACT THE NATIONAL WEATHER SERVICE.
DISCUSSION... DRY AND WARM CONDITIONS WILL CONTINUE AS HIGH PRESSURE
REMAINS OVER THE DESERT SOUTH WEST. MONSOONAL MOISTURE WILL REACH
FIRE AREA BY THURSDAY NIGHT AND MAY PRODUCE WETTING RAINS OVER SOME
AREAS.

FOR TODAY

WEATHER..... PARTLY CLOUDY

TEMPERATURE..... MAX 75 TO 80

HUMIDITY..... MIN 12 TO 16%

WIND... 20 FOOT..... SOUTHWEST 10 TO 15 MPH WITH GUSTS UP TO 25 MPH.

FOR TONIGHT

WEATHER..... MOSTLY CLEAR

TEMPERATURE..... MIN 40 TO 45

HUMIDITY..... MAX 45 TO 50%

WIND... 20 FOOT..... SOUTHWEST 5 TO 10 MPH BECOMING
DOWNSLOPE/DOWNVALLEY 4 TO 8 PH AFTER SUNSET.

OUTLOOK FOR TOMORROW

WEATHER.....PARTLY CLOUDY
TEMPERATURE.....MAX 75 TO 80
HUMIDITY.....MIN 14 TO 18%
WIND...20 FOOT.....SOUTHWEST 10 TO 15 MPH WITH GUSTS UP TO 25 MPH.

FORECASTER...SMITH/SETTJE

Spot Forecast for WATERFALL 1 Spot Forecast for WATERFALL 1 Fire
National Weather Service Reno
213 PM PDT Wed Jul 14 2004

IF CONDITIONS BECOME UNREPRESENTATIVE,
CONTACT THE NATIONAL WEATHER SERVICE.
DISCUSSION...DRY AND WARM CONDITIONS WILL CONTINUE AS HIGH PRESSURE
REMAINS OVER THE DESERT SOUTH WEST. MID AND HIGH LEVEL MOISTURE WILL
BEGIN TO SPREAD ACROSS THE AREA THURSDAY AND THURSDAY NIGHT. FRIDAY
EXPECT COOLER CONDITIONS WITH HIGHER RELATIVE HUMIDITIES. THE CHANCE
OF WETTING RAINS OVER THE AREA FRIDAY ARE MINIMAL. EXPECT AFTERNOON
WINDS FROM THE WEST SOUTHWEST AT 15 TO 25 MPH.

FOR TODAY

WEATHER.....MOSTLY SUNNY.
TEMPERATURE.....MAX 84 TO 86
HUMIDITY.....MIN 8 TO 12%
WIND...20 FOOT.....WEST SOUTHWEST 12 TO 16 MPH. GUSTS 30 TO 35 MPH
TIL 6PM.

FOR TONIGHT

WEATHER.....MOSTLY CLEAR.
TEMPERATURE.....MIN 55 TO 58
HUMIDITY.....MAX 30 TO 34%
WIND...20 FOOT.....6PM TO 9PM SOUTHWEST WIND 8 TO 12 MPH WITH
GUSTS 24 TO 28 MPH. AFTER 9PM BECOMING SLOPE
WINDS 2 TO 4 MPH.

OUTLOOK FOR TOMORROW

WEATHER.....PARTLY CLOUDY
TEMPERATURE.....MAX 82 TO 85
HUMIDITY.....MIN 9 TO 13%
WIND...20 FOOT.....LIGHT SLOPE WINDS. AFTERNOON WINDS
SOUTHWEST 10 TO 15 MPH WITH GUSTS UP TO 30 MPH.

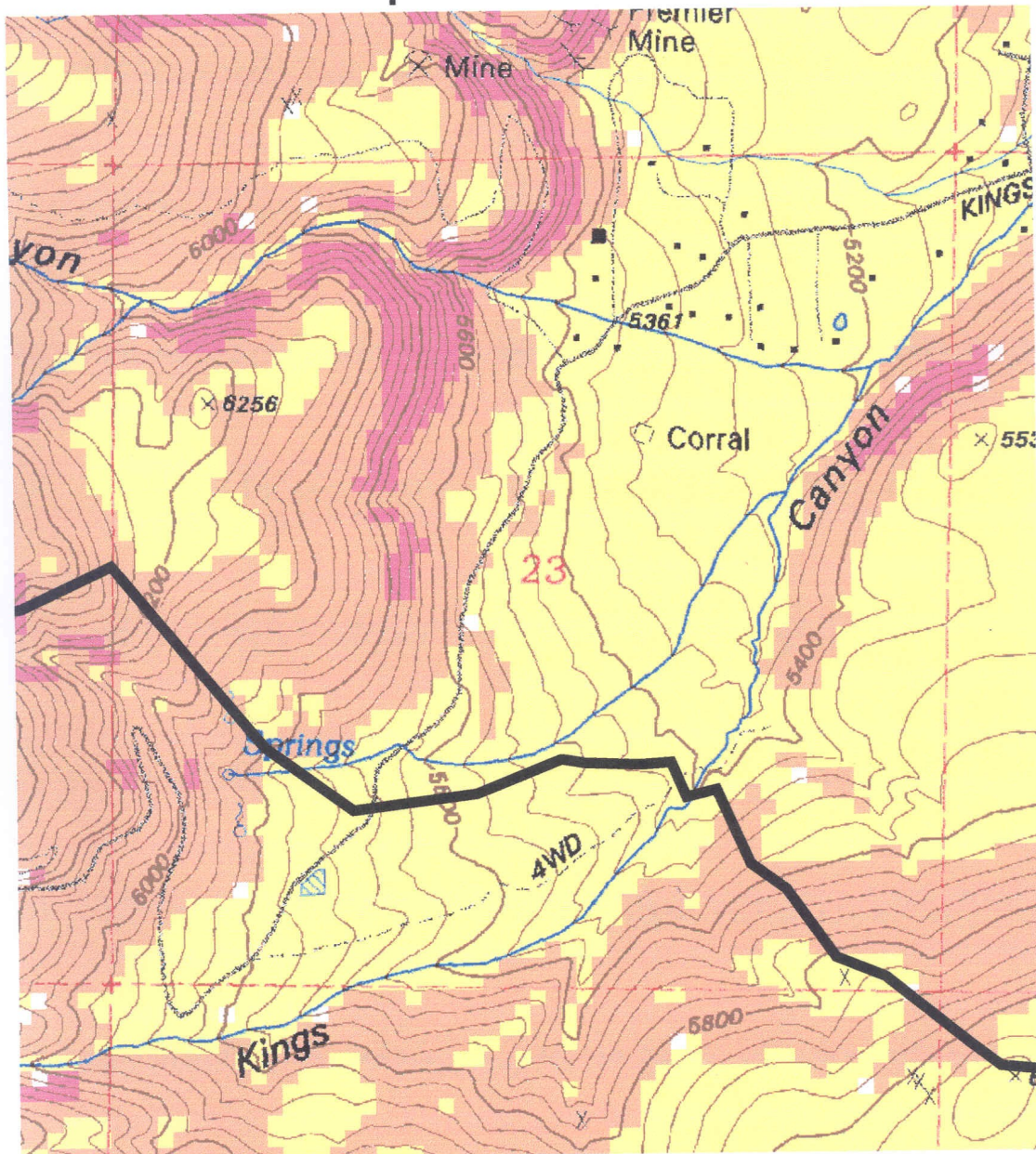
FORECASTER...JAH

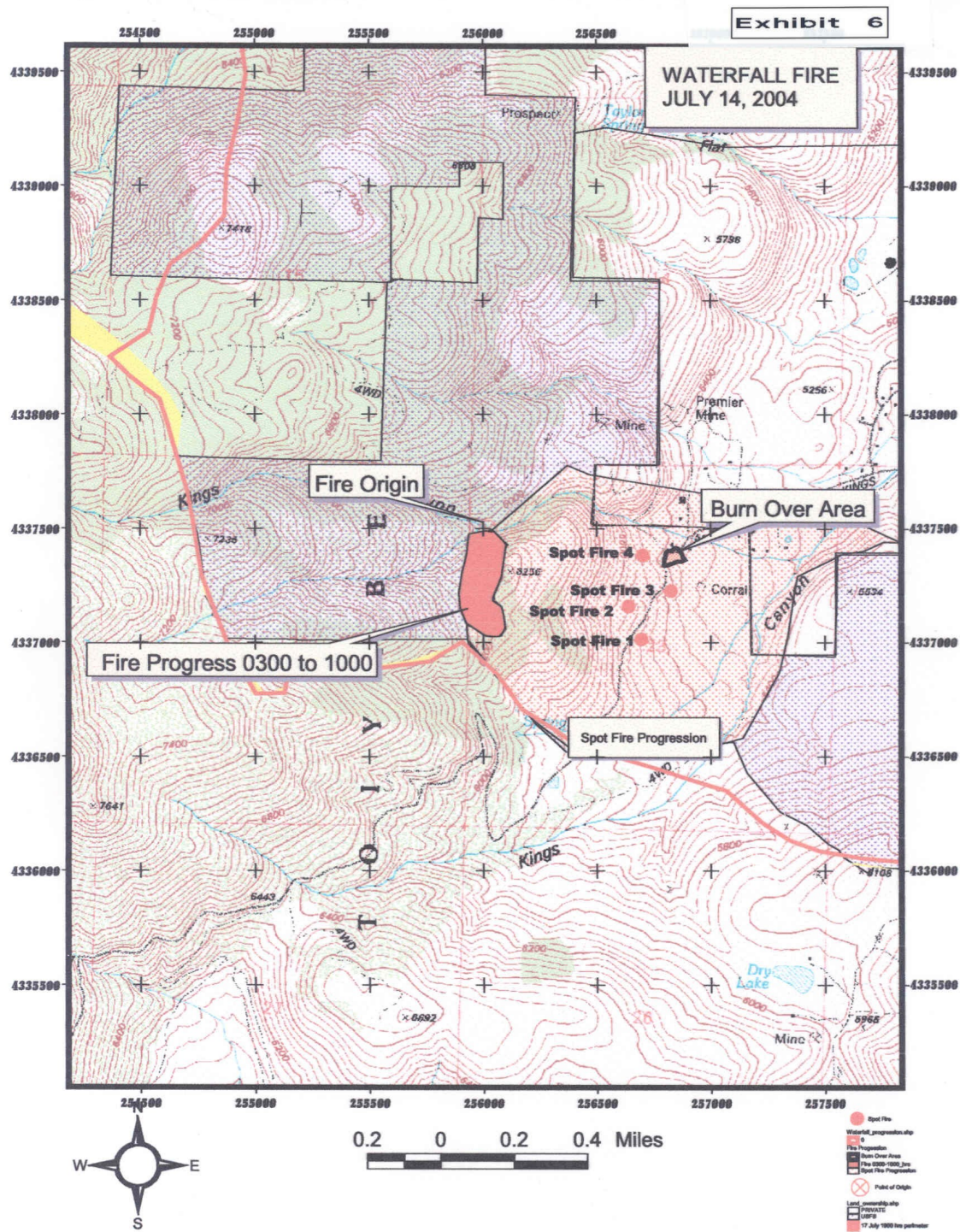
Orthophoto-quadrangle of Staging Area 2. Photo taken before the fire.



Slope Classes

Exhibit 3





Waterfall Incident Fire Progression July 14 - 17, 2004

